

INTRODUCTION

The present instruction manual describes the electronic ballast (device), how to operate it and what its potential applications are. The safety and hazard notices explain how to handle the device safely and properly. Familiarise yourself with the functions and properties of the device before starting with any installation work. In particular, read the safety notices contained in this instruction manual carefully. Failure to observe the safety notices may result in severe injuries or death. The following symbols are used in this instruction manual.



DANGER

This symbol indicates information that, if ignored, may instantly result in death or severe injuries.



ATTENTION

This symbol indicates information that, if ignored, may result in your device or your plant suffering damages.



NOTICE

This symbol indicates information that is especially important for operating the electronic ballast.

SAFETY NOTICES

The device was designed and tested pursuant to the latest technological findings and the applicable production safety standards. However, failure to observe the safety notices contained in this instruction manual may result in hazards for the user, third parties or property. These risks are reduced to a minimum if the electrician and plant operator comply with the safety notices at all times.



DANGER

- The device may only be installed by qualified electricians who have previously read and understood this instruction manual in full.
- The relevant electrician is responsible for compliance with the applicable local installation and safety regulations.
- All warranty and liability claims shall lapse if the installation or safety regulations are infringed.
- The device must not be opened under any circumstances.
- Before any work is performed on the connections of the device or the UV lamp (e.g. when replacing a lamp), the main switch and the main contactor must be switched off to eliminate the risk of electric shock. This is because the UV lamp is switched off electronically during normal operation. However, this does not mean that it is securely disconnected from the mains pursuant to the VDE (Association for Electrical, Electronic & Information Technologies). Once the ballast has been disconnected from the mains, there may be lethal residual voltages present on it for 10 minutes!

!!! ATTENTION: Danger of death !!!

Please observe the five safety regulations when working on electrical plants:



NOTICE

- Isolate.
- Secure against being switched back on again.
- De-energise.
- Earth and short-circuit.
- Cover or block neighbouring live parts.

MAINTENANCE

The device is maintenance-free and designed for a service life (MTBF) of 60,000 hours. The maintenance intervals on the control cabinet must be amended depending on the prevalent ambient conditions (especially dust loading). The following checks may be performed by the equipment operator. If problems are identified while these checks are being performed, please contact the manufacturer.

- Inspect the device for any visible external damage
- Check all of the electrical lines to ensure that they are in a perfect condition
- Loose cable connections must be remedied without delay and damaged cables must be replaced immediately
- Clean the filter inserts in the control cabinet



DANGER

Danger is caused by direct or indirect electrical contact. Observe the notices contained in the chapter entitled "Safety regulations" (page 9).

DISPOSAL

Once its service life has elapsed, please dispose of the device pursuant to the disposal regulations applicable at the installation location at the present point in time. You can also return the device to the manufacturer at your expense to ensure that it is disposed of properly. To find the correct address, please contact your local supplier of the device.

SCOPE OF DELIVERY

When you receive the goods, please immediately check that the delivery is undamaged and complete. Any damages identified must be documented instantly and reported to the manufacturer or sales partner without delay. The following is included in the scope of delivery:

- An operational and tested device. The maximum values (lamp current, lamp power, etc.) were pre-configured by the manufacturer. Individual parameterisation can be performed with the optional software interface OPA (Operating Performance Analyzer) and/or upon request.
- Assembly material for the ballast
 - 4x cylinder head screw with a M6x12 hexagon socket
 - 4x serrated washer to fit M6x12
- Plug for installing the device (art. no. 025 01102 0000; Note: One set of connectors are included with the device).
 - 1x lamp plug (Phoenixcontact IPC16/3-STF-SH-10,16, 1737323)
 - 1x 10-pin signal plug (Phoenixcontact FK-MC-0.5/10-ST-2.5, 1881406)
 - 1x 2-pin signal plug (Phoenixcontact FK-MC-0.5/2-ST-2.5, 1881325)
 - 1x mains plug (Phoenixcontact SPC5/4-STCL-7.62, 1718504)



Available as an option:

- Software interface OPA (Operating Performance Analyzer) consisting of a software package and Adapter set eUV CANopen - PC (USB), art. No. 025 01087 0000.



NOTICE

Please dispose of the packaging material in an environmentally friendly manner. You may even be able to re-use the packaging. We advise that you keep the packaging material for subsequent returns or other transport operations.

TRANSPORT, STORAGE, RETURN

The device is supplied in cardboard packaging pursuant to the DIN/ISO 2248/2206 standard and is permissible for parcel service. The following ambient conditions must not be exceeded at any time during transport and storage:

Temperature range	-10°C to +55°C	during storage
Temperature range	-50°C to +95°C	during transport
Air humidity	5% bis 95%	non-condensing (during transport and storage)

Avoid temporarily storing the device outdoors for extended periods of time when it is unsupervised and unprotected. If you are returning or forwarding the device, ensure that the original packaging elements (two foam inserts and cardboard packaging) are used and positioned correctly. Ensure that both the packaging base and packaging lid are bonded correctly. The device must be packaged as shown in the following figure.



ATTENTION

If the device is being shipped, only the original packaging may be used. Otherwise, damage to the device is unavoidable.

If the original packaging elements are unavailable, please consult with the manufacturer. Packaging can be requested from the manufacturer for a charge.

REPAIRS

If the device suffers damages or defects of any kind, the device must be returned to the manufacturer for checking or repairs.



DANGER

Opening of the device is prohibited and may instantly result in death or severe injuries.



NOTICE

Any guarantee claim shall lapse if the device is opened or the device seal is broken!

BENEFITS COMPARED WITH CONVENTIONAL BALLASTS

The device is an electronic ballast for operating UV medium-pressure lamps. The devices allow depending on its version output powers up to 12.0kW at a lamp voltage of up to 450V (and/or up to a lamp voltage of 585V @ 480VAC). Compared with conventional ballasts, this one delivers the following essential benefits:



Technology

The EfficientSwitch™ technology enables virtually loss-free current commutation to the half-bridge circuits. This allows a significant reduction in the switching losses, enabling a more compact and lightweight design, lower EMC and a unique control performance.



Low-frequency AC square wave operation

The low-frequency AC square-wave operation guarantees even irradiation with a virtually unmodulated power flow. This enables optimum activation of virtually any lamp type and power.



Real power control

An integrated microcontroller enables real power control of the lamp power from 5% to 100%. This allows for compensation of lamp voltage tolerances and guarantees a production result that can be reproduced exactly. No power reserves are necessary. Mains voltage fluctuations are optimally adjusted. In the case of longer breaks, the lamp power can be reduced with ease, thus saving on energy costs.



Integrated high-frequency ignition

The integrated ignitor supplies energy-rich and lamp-friendly pulse trains with a sinus amplitude of up to 5,000V. The start sequence enables an optimum, fast and gentle lamp start for any lamp type. The lamp cable length has no negative influence on the ignition behaviour. All in all, the lamp service life and even so-called "lazy ignitor" lamps can be optimally ignited.



Wide-range input

The device can be used irrespective of the mains frequency (48Hz – 62Hz) at a three-phase mains voltage of between 360VAC and 530VAC. This gives equipment manufacturers the maximum possible flexibility and reduces both storage and logistics costs.



No zero conductor necessary

Thanks to their customer-orientated design the devices does not require a zero conductor. Combined with the wide-range input, this offers the maximum possible market coverage.



Lamp Cable length of up to 300m

The low-frequency AC square-wave operation minimises the risk of EMC problems especially in applications with longer lamp cable lengths, as is conventional in the timber or chemicals industry. The integrated automatic ignition sequence adapts to a very wide range of cable lengths and guarantees the best possible lamp ignition.



PELV safety standard

The control signals are isolated from the mains, are designed to be short-circuit-proof and have a near-earth ground. The PELV (Protective Extra Low Voltage) protective measure can be implemented with extreme ease.



Compatible with the IT mains systems / insulation resistance more than 1GΩ (DC-measurement)

As the only device of its kind in the world at the present time, the "EfficientSwitch™" technology is compatible with the IT mains without any need for further technical intervention and, at the same time, complies with the European EMC standards.



Real AC mains voltage measurement

The real AC mains voltage measurement integrated as standard offers the maximum possible protection for the device and enables valuable feedback to be provided to the system control.

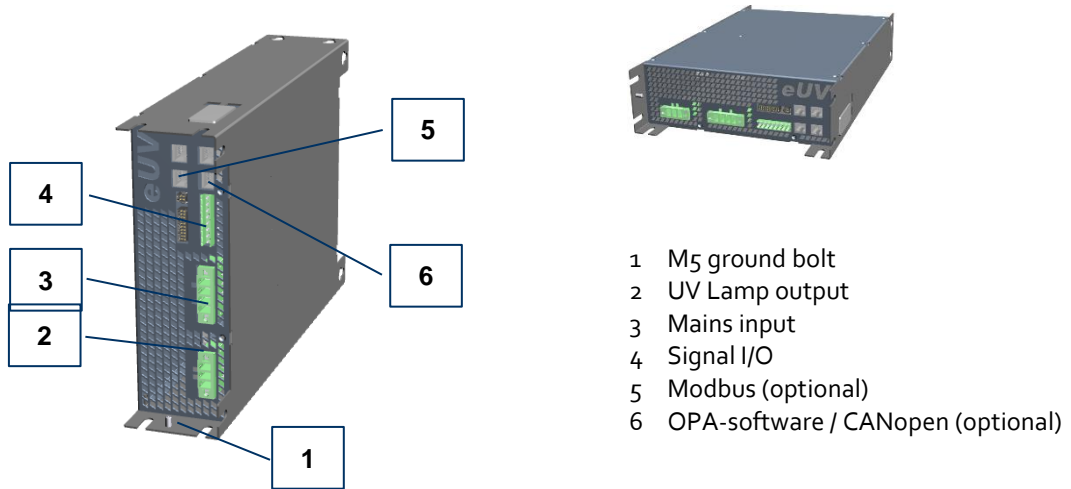


Field bus options

The device is available with common Fieldbus protocols.

ASSEMBLY AND COOLING

CONNECTIONS



GENERAL AMBIENT CONDITIONS

The device is designed for a closed-control-cabinet environment. The cooling air must be clean and must not contain any corrosive components and/or electroconductive dust. Higher ambient temperatures require consultation with the manufacturer.

protection category	IP20	
protection against foreign bodies	5.5 mm	e.g. screws, small parts, etc.
recommended cooling air per device	150m ³ /h	or lower as required
ambient temperature range	0°C to +40°C	at 100% continuous power
resistance to climatic conditions	class 3K3 according EN 50178	non-condensing, average relative humidity 20 to 90%
derating (current and/or power reduction)	6A/°C (automatic)	measuring point on the IGBT from +110°C. Temperature switch-off in the event of overload
noise emission	≤70dB(A)	at a distance of 1m

A deviating ambient temperature is possible but must be arranged with the manufacturer

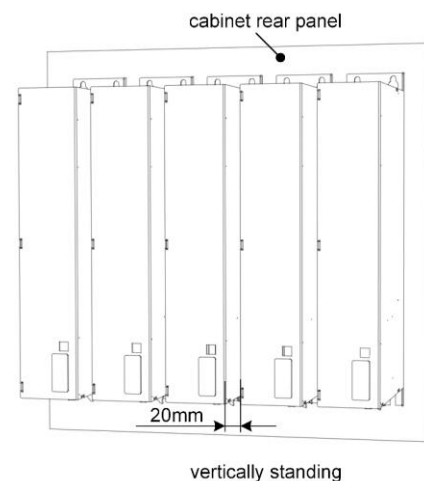


ATTENTION

Before installation and commissioning, the device must be stored at room temperature for at least four hours.

INSTALLATION LOCATIONS

The device can be fastened to the control cabinet wall in both a horizontal and a vertical position (see figure). The distance between the device and the side walls of the control cabinet must be at least 20mm. When installed vertically standing, the device can be arranged in the control cabinet in a very compact manner (e.g. 10 electronic ballasts within 1m).





ATTENTION

During assembly, all four screws and all four toothed washers from the enclosed assembly set must be used. The toothed washers press to the paint, thus ensuring a secure electrical connection between the device and the control cabinet (EMC).

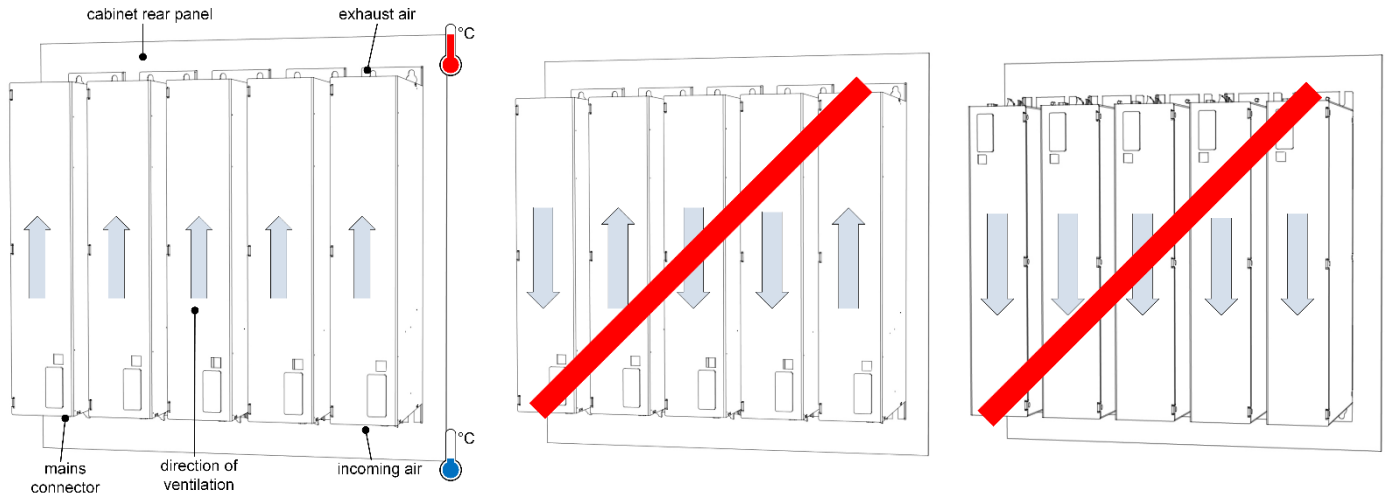


ATTENTION

It is prohibited to carry out installation activities (e.g. drilling holes) above the device, whereby foreign bodies (e.g. metal shavings) could enter the device. If, however, installation activities are unavoidable, the device must be covered respectively the cooling openings taped.

COOLING

The device must preferably be installed in the cool, lower area of the control cabinet. All of the supply air openings must be located underneath the device exhaust air openings. The ventilation direction is marked on the device with an arrow.



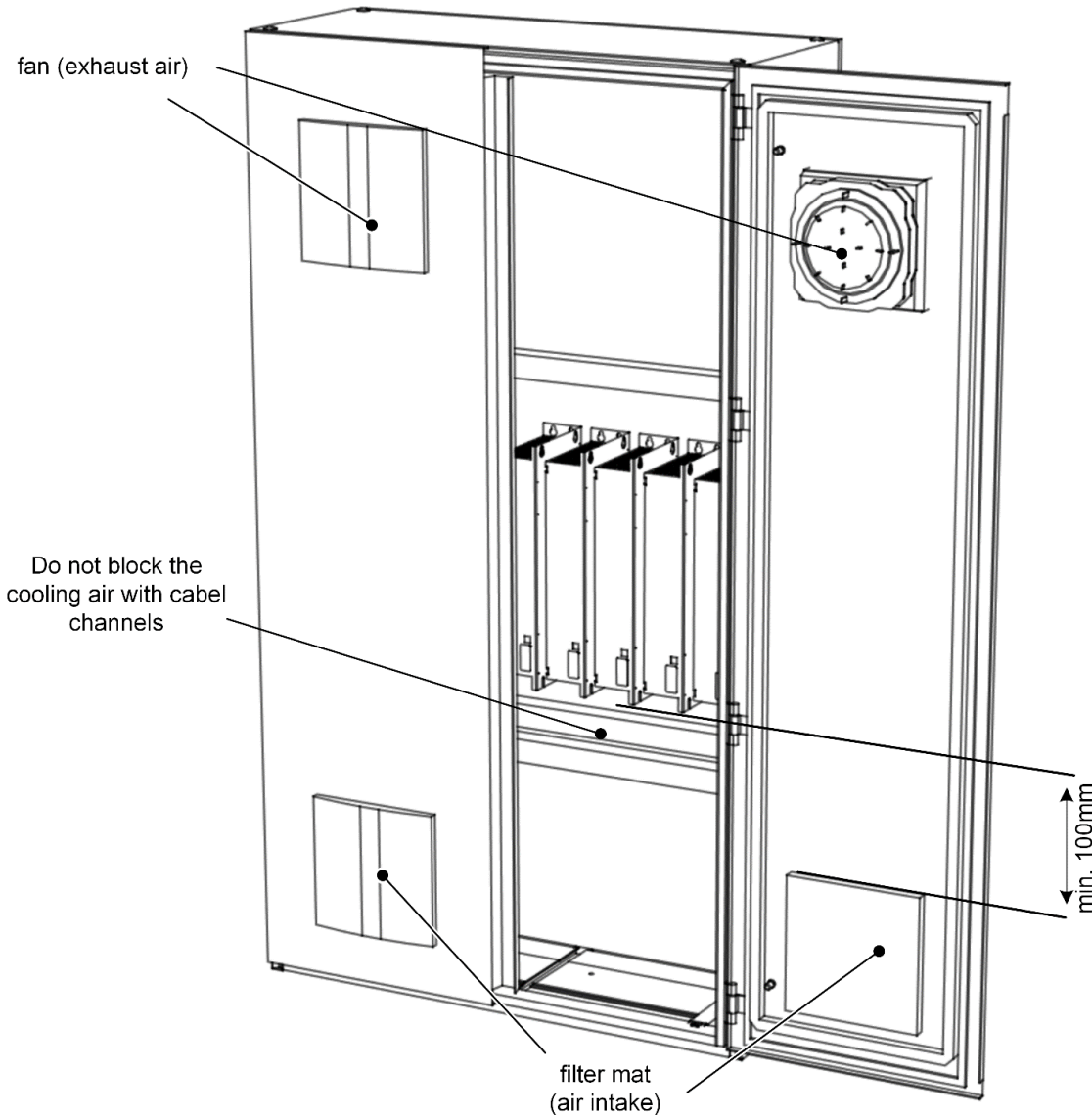
ATTENTION

The device ventilation direction must be observed. Sufficient cooling cannot be guaranteed if you fail to observe this.



ATTENTION

We do not advise assembling several devices one on top of the other. Otherwise, sufficient cooling cannot be guaranteed, as the top devices receive the warm exhaust air of the bottom devices. If stacked assembly is necessary nonetheless, we would advise checking the temperature using the software interface OPA (Operation Performance Analyzer). In this regard, please especially observe the information provided on derating behaviour in the chapter entitled "GENERAL AMBIENT CONDITIONS" (see page 13).



NOTICE

We would advise extracting the exhaust air on the top from the control cabinet and, in the case of supply air, using filter mats just like with exhaust air. If your control cabinet is situated in a contaminated environment, we would advise using a closed and air-conditioned control cabinet.



ATTENTION

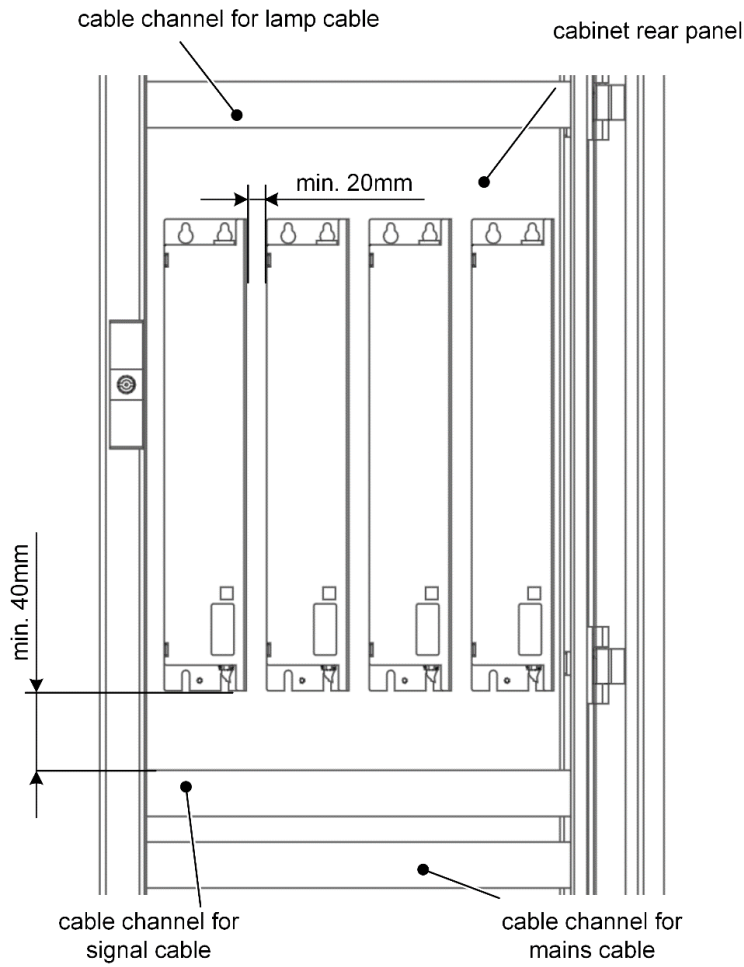
All moving parts of the control cabinet must be earthed with low impedance. Otherwise, potential displacement can occur, which can destroy the device.



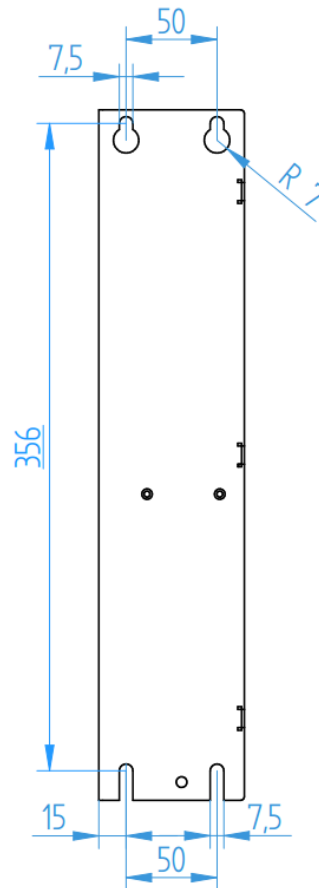
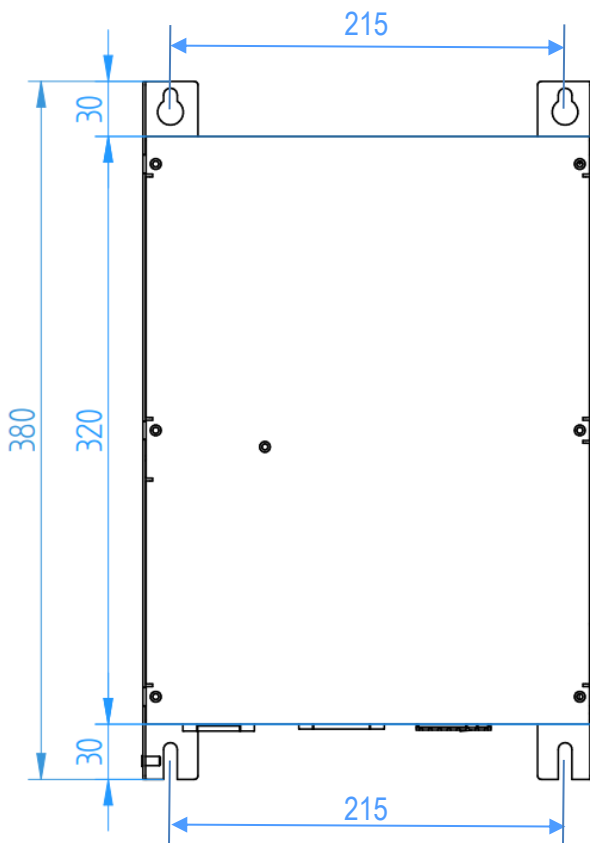
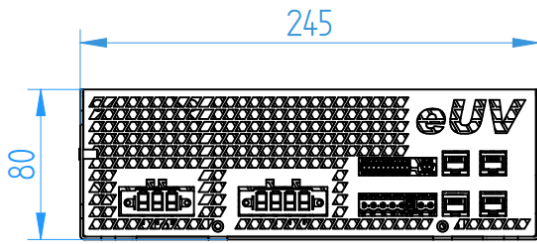
ATTENTION

The cooling flow must not be blocked (e.g. by cable ducts) on the devices supply air opening or exhaust air opening. Otherwise, sufficient cooling cannot be guaranteed.

Width of the cable channel	Max.	40 mm
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DIMENSIONAL DRAWING



Electrical installation

MAINS INPUT

The device is connected to the three-phase mains without a zero conductor. To comply with the safety standard EN 50178 (VDE0160), a double protective conductor version is compulsory, i.e. in addition to the earthing on the mains plug, the device must be earthed to the ground bolt using a 10mm² copper line. In the case of permanent installation, a switch-off device (3-pole circuit breaker, characteristic B or safety fuse, types gR or gS) must be provided.



ATTENTION

Operation of the device without any protective equipment (circuit breaker or fuse) is impermissible!



ATTENTION

At operation of the device in areas with instable mains system conditions it is compulsory to care for adequate protective measures for permanent safety of the device. (see page 19, overvoltage protection)

Output power	typ.	2.5	5.0	6.0	7.5	9.0	10.0	11.0	kW	at a lamp voltage of max. 450V
Input power	max.	2.6	5.2	6.2	7.7	9.3	10.4	11.5	kW	
Mains current	max.	7.7	11.0	13.2	15.5	18.6	20.9	23.0	A	at a mains voltage of 360V _{ac}
Power factor	typ.	0.66	0.80	0.83	0.86	0.89	0.90	0.91	-	@1,0·P _{out} @ 400V _{ac}
Efficiency	typ.	96	97	97	98	98	98	98	%	@1,0·P _{out} @ 400V _{ac}
Fuse	min.	8	12	15	20	20	25	25	A	on the mains input
Cable cross-section	min.	1.5	2.5	2.5	4.0	4.0	4.0	4.0	mm ²	flexible copper strand on the mains input

Mains voltage	nom.	3x400-480	V _{ac}	wide-range input, TN, TT, IT mains
Mains voltage range ¹	max.	3x360-530	V _{ac}	continuous operation
Mains frequency		48-62	Hz	
Phase voltage against PE	max.	500	V _{ac}	IEC 60664-1
Undervoltage limit	typ.	300	V _{ac}	425V _{dc} /0.5ms results in switching off the lamp
Overvoltage limit	typ.	565	V _{ac}	800V _{dc} /0.5ms or 850V _{dc} /50us results in switching off the lamp
Cos φ	typ.	>0,95	-	no reactive current compensation necessary
Switch-on current	max.	100	A	50μs sinus half-wave
Switch-on current	max.	10	A	50ms (internal pre-charge resistor)
Switch-on delay	typ.	1-2	s	
Switch-off in the event of phase failure	typ.	<0,5	ms	
Switch-off in the event of overvoltage	typ.	>800	V _{pk}	peak voltage between two phases
Switch-off in the event of undervoltage	typ.	<300	V _{ac}	
Internal protection against transient voltages				MOV (Metal Oxide Varistor)
Fuse				not integrated

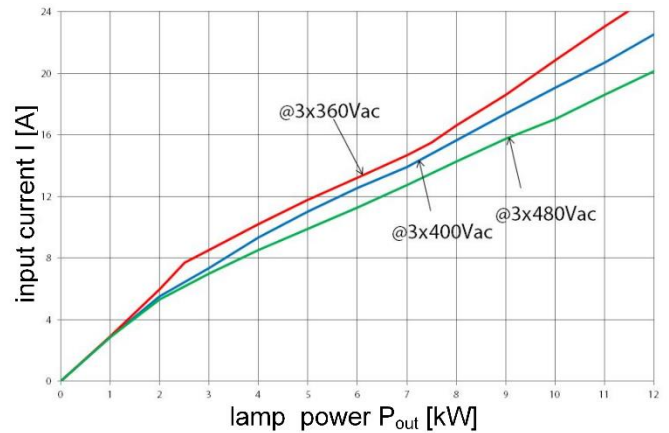
- 1.) 3x200-220 V_{ac} for Japanese mains conditions are possible optionally. Please consult in case of request the manufacturer for creating a specific configuration.

If a device is not working at the maximum power (e.g. a 5kW device with a 3kW lamp), the mains current can be determined with the help of the following diagram. This enables considerable cross-section and cost savings to be made when several devices are used in line.



NOTICE

Further installation notices can be found in the chapter entitled “*Connection diagram*” (page 26).



ATTENTION

All moving parts of the control cabinet must be earthed with low impedance. Otherwise, potential displacement can occur, which can destroy the device.

OVERVOLTAGE PROTECTION

We would advise using overvoltage protectors to optimally protect the device. The use of a suitable varistor module plus an appropriate voltage monitoring relay ensures best possible safety for the device. To select the ideal types, please contact the manufacturer with precise information about the relevant mains (TN, TT, IT, etc.) and the prevalent mains voltage.



ATTENTION

When operating several devices, we would advise switching the devices on or off in staggered time intervals of 2 seconds to avoid high switch-on currents during switch-on operations or switching surges during switch-off operations.

LAMP OUTPUT



DANGER

When working on the lamp output, the device must be disconnected from the mains and a waiting time of at least 10 minutes complied with! Observe the safety notices contained in the chapter entitled "Safety regulations" (page 9)!

The device allows lamp cable lengths of up to 300m. The lamp output of the device is designed to be resistant against short-circuit, open-circuit operation and earth leakage. Several lamps can be connected in series. The lamp currents and the required cable cross-sections are illustrated in the following table.

Output power		5-100	%	dimnable from 5% to 100%
Power accuracy	typ.	+3/-3	%	
Control settling time	typ.	<3	ms	
Frequency		50	Hz	or parameterisable after consultation with the manufacturer
Lamp voltage	max.	450	V	symm. Square-wave voltage @3x360VAC
Lamp voltage	max.	585	V	symm. Square-wave voltage @3x480V
Lamp voltage	max.	245	V	symm. Square-wave voltage @3x200V (consultation with manufacturer required since this is a specific configuration for Japan.
Lamp current	max.	22,0/28,5 ¹	A	parameterisable 1.) only in the case of a 10.0/11.0kW device max. 22A@480VAC
Minimum lamp current	typ.	2.0	A	parameterisable
Direct current offset	max.	100	mA	
Cable length	max.	300	m	shielding recommended
Cable cross-section	min.	up to 15A: 2.5; from 15A: 4.0	mm ²	lamp side, flexible
Ignition voltage	typ.	5	kV	sinusoidal
Ignition frequency	typ.	20	kHz	
Ignition duration	max.	1000	ms	ignition lock: 5 sec.
Short-circuit identification on lamp	typ.	20	V	deactivates for 2 min. after lamp start
Minimum lamp voltage	typ.	50	V	switch-off in the event of a shortfall of >1 sec.
Earth leakage triggering threshold	typ.	2	A	no personal protection
Earth leakage response time	typ.	50	µs	switch-off following ground leakage in the lamp circuit

Connect the cable shield on the lamp side to the metal lug of the lamp plug using cable ties and insulate with a shrink hose! Installation between the device and lamp must be configured to at least 5kV due to the high ignition voltage. Between the lamp lines and the signal lines, comply with a safety distance of at least 5cm to avoid probable interference. No other parts must be earthed via the lamp cable. Under no circumstances must the lamp housing be earthed via the lamp line shielding, which is why a separate cable must be used for earthing. The device has an internal ignitor and under no circumstances must an external ignitor or other components (measuring devices, etc.) be connected.



NOTICE

The lamp cable must be laid in a cable duct. Loose installation is not permissible.



NOTICE

Under no circumstances must the lamp cable be laid in a cable duct together with the power cord and/or control cable.



NOTICE

To ensure that the shield is connected, both screws on the lamp connector must be tightened professionally.



NOTICE

Further installation notices can be found in the chapter entitled "Connection diagram" (page 26).

DEVICE SELECTION TABLE

Art. No.	Type	Max.output power P	Min. lamp operating voltage $U_{B \min}$	Max. lamp operating voltage $U_{B \max}$	Max. lamp current I_B
		kW	V	V	A
630 20107 0000	eUV-1 Compact 2,5kW 120-450V (C0/C1/C2)	2,5	120	450	22
630 20108 0000	eUV-1 Compact 5kW 240-450V (C0/C1/C2)	5	240	450	22
630 20053 0000	eUV-1 Compact 6kW 280-450V (C0/C1/C2)	6	280	450	22
630 20055 0000	eUV-1 Compact 7,5kW 350-450V (C0/C1/C2)	7,5	350	450	22
630 20110 0000	eUV-1 Compact 9kW 412-450V (C0/C1/C2)	9	412	450	22
630 20049 0000	eUV-1 Compact 10kW 360-450V (C0/C1/C2)	10	360	450	28
630 20050 0000	eUV-1 Compact 11kW 400-450V (C0/C1/C2)	12	400	450	28

Notes:

- The lamp voltage (tolerances incl.) must be within the specified minimum and maximum lamp operating voltage.
- The min. lamp operating voltage is the lamp voltage to be able to get the max. power.
If the lamp voltage would be lower, the max. power of the Electronic Power Supply could not be reached.
- eUVs with the identification **C0** have analog inputs and analog/digital outputs.
- eUVs with the identification **C1** can be controlled via **CANopen** or alternatively analog/digital (PDO list available).
- eUVs with the identification **C2** can be controlled via **Modbus** or alternatively analog/digital



NOTICE

It is recommended to do not use the full available device current at 480VAC mains conditions. (recommendation minus 20%)
At 480VAC mains voltage the lamp voltage is allowed to be 20% higher as mentioned in the selection table. (recommendation plus 20%)

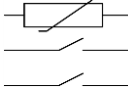
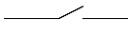
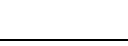



NOTICE

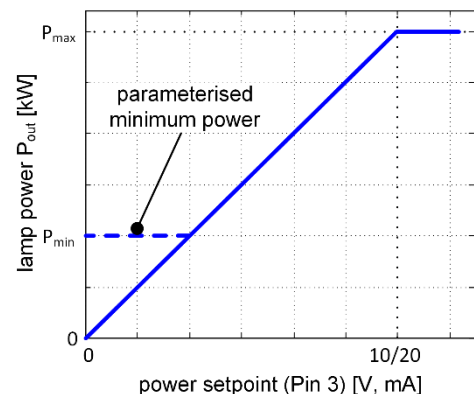
At 200V 3phase mains conditions (e.g. Japan) the values mentioned in the device selection table are not valid.
Please consult in case of request the manufacturer for selection for the suitable device configuration.

CONTROL SIGNALS

The control signals are isolated from the mains, are designed to be short-circuit-proof and have a near-earth ground (200kΩ/22nF). By bridging pin 1 (GND) to the device ground bolt (PE), the PELV (Protective Extra Low Voltage) protective measure is implemented.

Pin	Designation	Description
1	GND	signal ground 0V; maximum ±25 V against PE (PELV by bridging to the ground bolt)
2	Start	activate ballast; active: +5V – +24V; inactive 0V; $R_i = 1k\Omega$
3	Power Setpoint	analog input for the lamp power; voltage 0 – 10V or current 0 – 20mA
4	Lamp Voltage / Failure code	analog output for the lamp voltage (Scaled with 10mV/V -> factor: 100) <u>Example:</u> DC 4,2 V -> corresponds to lamp voltage $U_B = 420$ V or for the error code) 0 – 10V; max. 2mA; delay 20ms
5	Relais Common	 joint contact for Operational, Failure and Warning; maximum 24V/300mA
6	Relais Operational	 relay output for Operational; the contact is closed during operation
7	Relais Failure	 relay output for Failure; the contact is open in the event of errors
8	CAN_L	CAN_L; -24V < CAN_L < +24V
9	CAN_H	CAN_H; -24V < CAN_H < +24V
10	PE / Shielding	connection for control cable shielding (connected internally to the housing ground)
11	Lamp Power	analog output for the lamp power; 0V-10V; 10V=100% of the parameterised lamp power
12	Relais Warning	 relay output for Warning; for details, see the flow chart

In the diagram on the right, the link between the lamp power setpoint (pin 3) and the actual lamp power is illustrated. 10V or 20mA on pin 3 correspond to the parameterised maximum power (e.g. 5V=50%· P_{max}).



Pin 3	Output power
0-10V	0-100%· P_{max}

In the case of a parameterised minimum power, the following applies: If the setpoint is smaller than the parameterised minimum power, the device constantly emits the parameterised minimum power.



DANGER

Protection in the event of direct contact at voltages lower than 60V (PELV = Protective Extra Low Voltage pursuant to EN 61800-5-1) is only permissible in areas with potential compensation and in dry environments. If these conditions are not met, other protective measures against electric shock, e.g. protective insulation, must be taken.



NOTICE

The value must not fall below the parameterised minimum power.



NOTICE

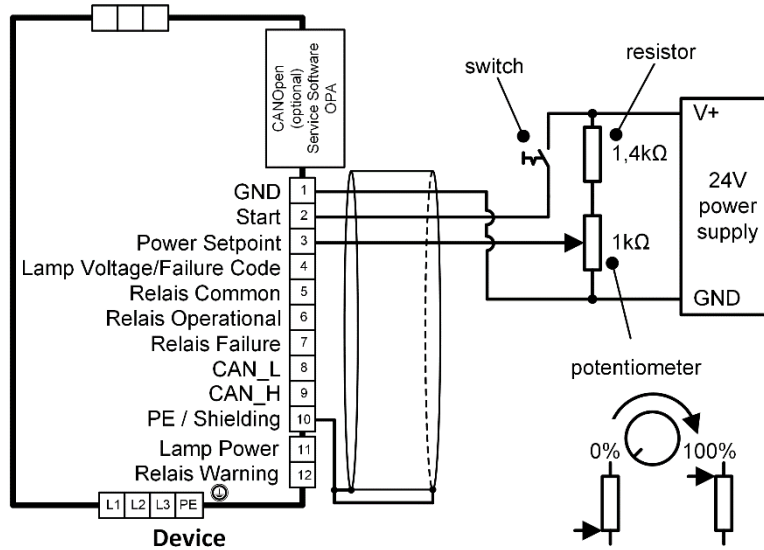
During start-up, pin 4 emits the lamp voltage with the scaling factor 10mV/V (e.g. 2.0V at a lamp voltage of 200V).



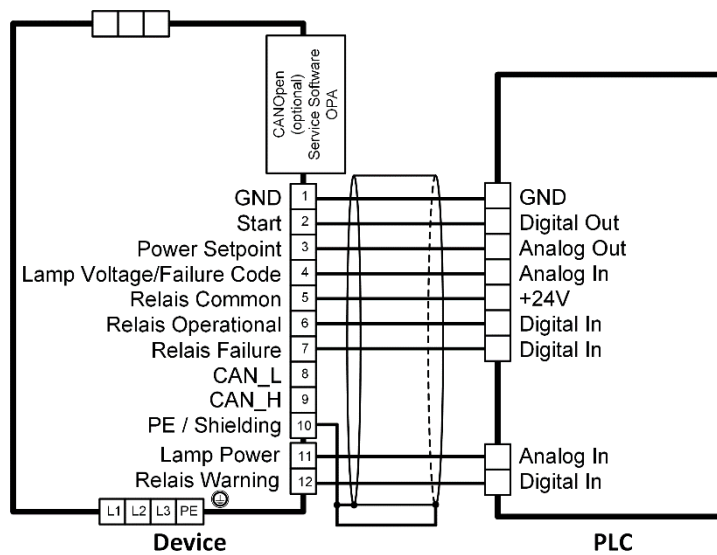
NOTICE

Further installation notices can be found in the chapter entitled "Connection diagram" (page 26).

SAMPLE CONNECTION FOR MINIMUM SIGNAL CIRCUITRY



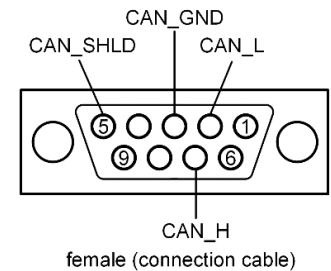
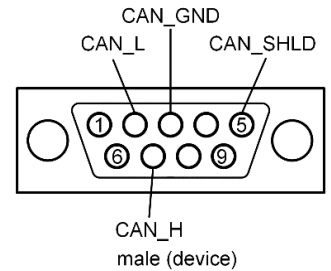
SAMPLE CONNECTION OF ANALOG PLC CONNECTION



SERVICE SOFTWARE 9-PIN SUB-D PLUG

The device is connected to the service software OPA (**O**peration **P**erformance **A**nalyzer) using the 9-pin Sub-D plug. This plug is provided for the CANopen device version (available as an option) at the same time. The manual for this is available separately.

Pin	Signal	Colour	Description
1	-		reserved
2	CAN_L (dominant low)	Ws	CAN_L bus line (dominant low)
3	CAN_GND	Br	CAN ground
4	-		reserved
5	CAN_SHLD		optional CAN shielding
6	GND		optional CAN ground
7	CAN_H	Yw	CAN_H bus line (dominant high)
8	-		reserved
9	CAN_V+	Gr	optional positive supply voltage



NOTICE

The service software OPA (**O**peration **P**erformance **A**nalyzer) and the suitable cable and adapter set is available optionally (see the chapter entitled SCOPE OF DELIVERY, page 11).

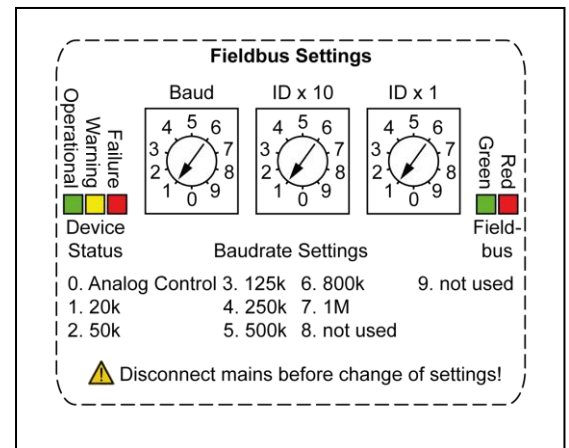
ROTARY-SWITCH SETTINGS

Baud switch	description
0.	baud (analog control)
1.-7.	baud rate for optional fieldbus communication
8.-9.	reserved

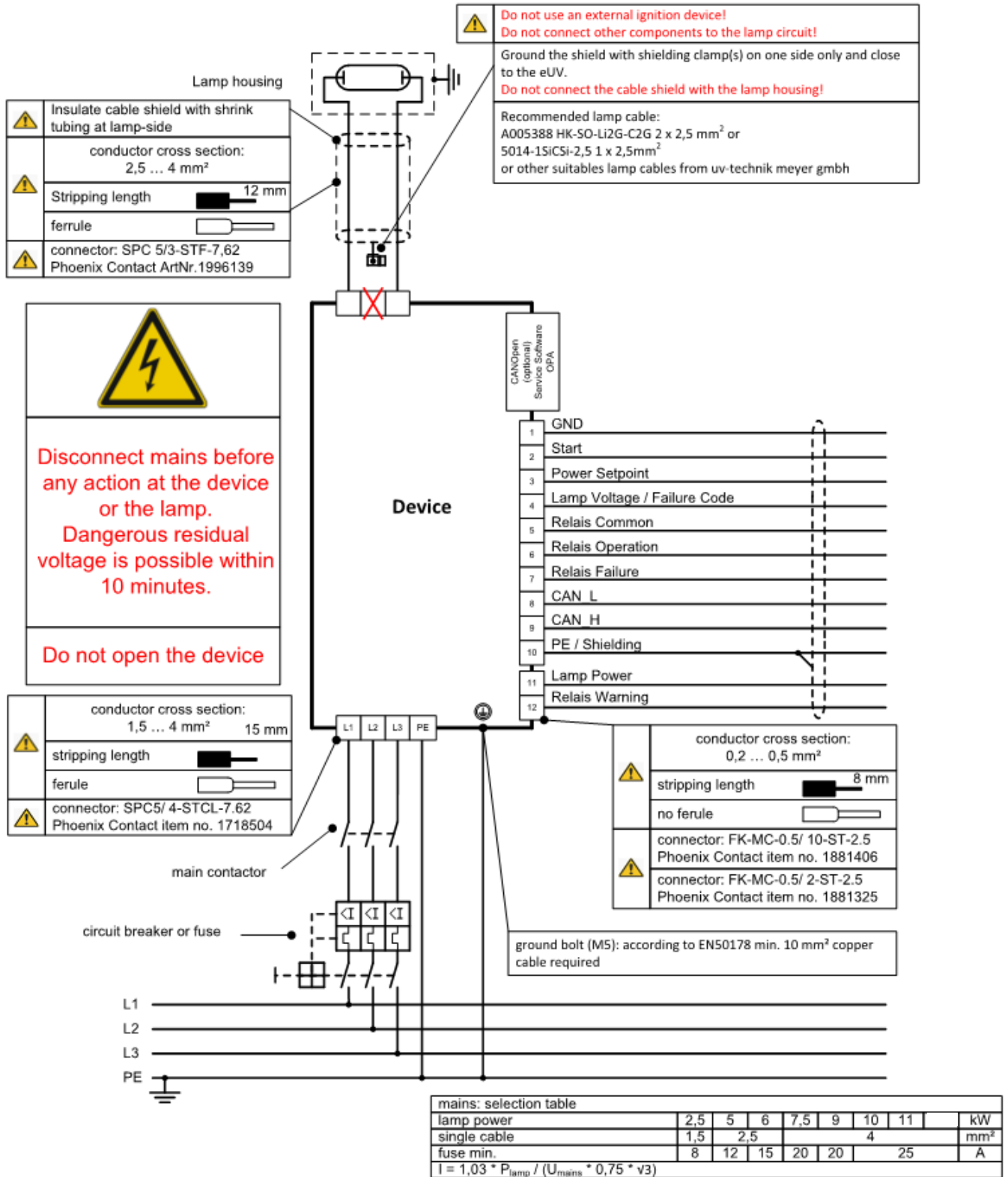
ID switch	description
1.-99.	ID assignment for fieldbus
0.0.	both switches at 0. is not allowed

device status	description
3 x LED left side	signalise the operating mode

Fieldbus	description
2 x LED Right side	signalise the operating mode of the optionally fieldbus
green	fieldbus communication active
red	fieldbus communication failure



CONNECTION DIAGRAM



OPERATING BEHAVIOUR, FUNCTIONAL DESCRIPTION

“READY” OPERATING MODE

After connecting the mains connector, the device is in the “Ready” operating mode and the lamp is deactivated. The aim of this mode is to initiate the ignition process and power up the lamp to the parameterised power. Within the first 5 seconds, internal device capacitors are gently charged up and the firmware is initialised. Afterwards, the device waits until the ignition process is started by pin 2 on the signal connector (“Start”) with a voltage of +5 – +24V. Optionally the start process can also be initiated using the power setpoint.



NOTICE

Pin 2 on the signal connector is edge-triggered and conducted with a Schmitt trigger input. The eUV must be connected to the mains before the start signal is given to pin 2.

If ignition has not taken place within one second, the device enters “Failure” operating mode. Once ignition has successfully taken place, the lamp is powered up to 100% of the parameterised power as quickly as possible using the device’s own lamp management. The warm-up current can be adjusted separately during this process. Normally, the maximum available warm-up current is permitted so the lamp powers up as quickly as possible. In special cases, a reduced warm-up current is possible so that damages to the sensitive lamps are avoided. During the lamp power-up process, pin 4, which has a dual function (“Lamp voltage” when operational / “Failure code” in the event of error), indicate the scaled lamp voltage (scaling factor of 10mV/V) (e.g. 2.0V correspond to a lamp voltage of 200V). The lamp voltage can thus be monitored and visualised with ease during the power-up process.

“OPERATIONAL” OPERATING MODE

Once the parameterised maximum lamp power has been reached, the device directly switches to “Operational” operating mode. This is indicated by means of the “Operational” relay contact (pin 5 “Common” and pin 6 “Operational” on the signal connector). From this point in time, the device regulates on the power setpoint, which is allocated using pin 3 of the signal connector (“Power Setpoint”). The setpoint can be specified as a voltage value (0 - 10V) or as a current value (0 – 20mA). The requested and output powers are constantly compared within this operating mode.

“WARNING” OPERATING MODE

If the required power was not met within the last one second, a warning is issued on pin 4. In event of power deviations of less than 20%, permanent operation with reduced production speed is possible (e.g. in a reel application to complete the current production order). A deviation of more than 20% to the power setpoint causes the device to switch to “Failure” operating mode. The “Warning” relay (pin 12) enables early identification and intervention in case if the power setpoint should deviate from real lamp power.

“FAILURE” OPERATING MODE

The device is designed to be intrinsically safe and has a multitude of monitoring functions integrated that protect the device in extreme situations (e.g. in the event of an overvoltage) and result in the safe “Failure” operating mode. During this process, the “Failure” relay contact (pin 5 “Common” and pin 7 “Failure” on the signal connector) opens and enables immediate failure identification in the superordinate production process. The lamp is deactivated and the device thus remains in this condition until the user restarts it.

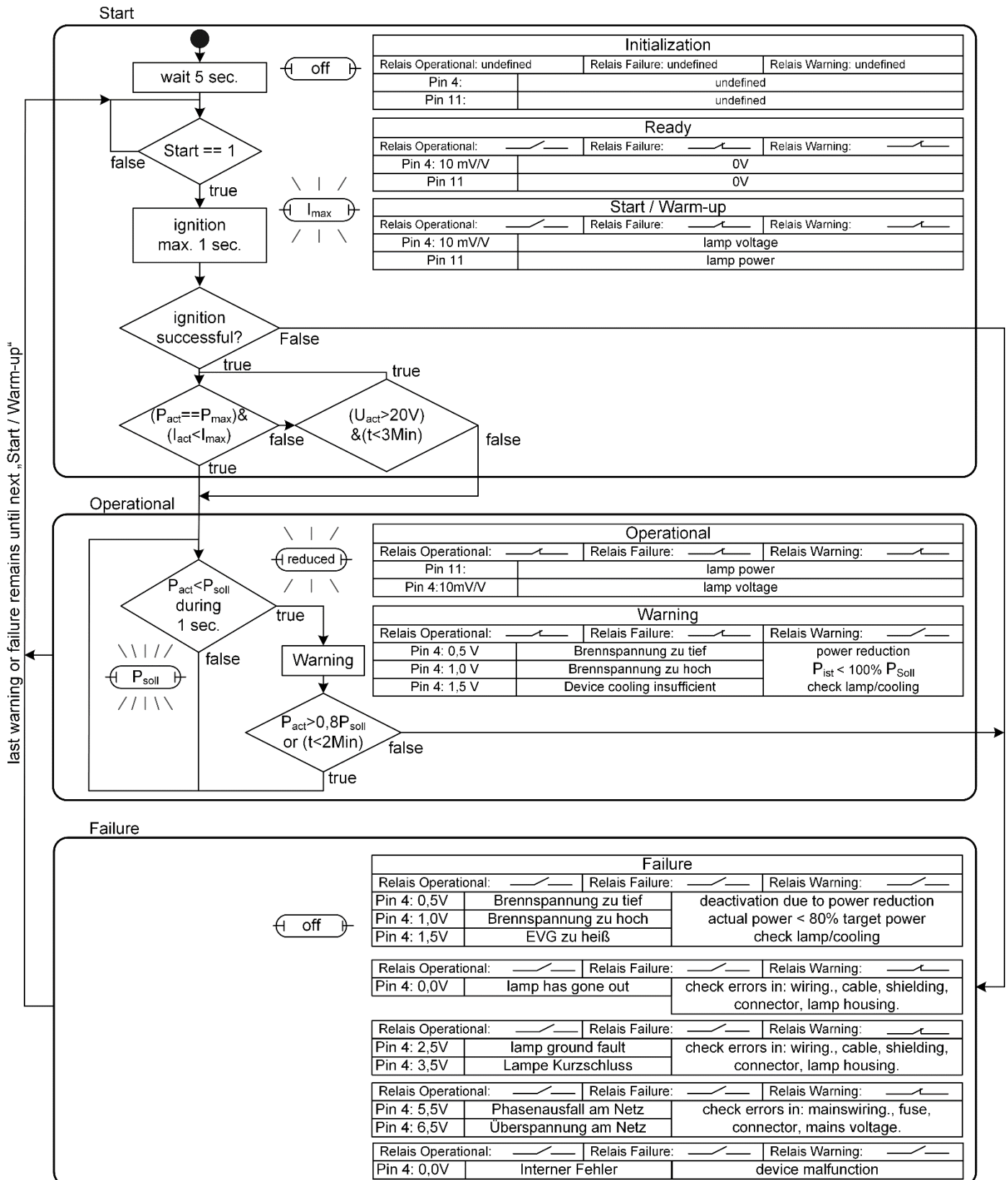


NOTICE

To identify the error type (e.g. lamp short-circuit, etc.), it is necessary to read the analog voltage of pin 4 right after the error has been identified. Otherwise, the information about the cause of the error is lost.

In the case of an internal error, the device must be returned to the manufacturer for checking purposes. In the event of the other sources of error, pin 2 must be deactivated and a waiting time of 5 seconds complied with before the ballast is restarted with a renewed edge on pin 2.

FLOW CHART



OPERATING AND FAILURE CONDITIONS

The possible operating and error conditions (indicated on pin 4) are illustrated in the following table.

Output Voltage/ Failure code (Pin 4)	OPERATIONAL	WARNING	FAILURE	Description / cause of the problem	Detailed description
0 V				ready	0V... ready
0 – 10V				normal operation; actual power corresponds to power setpoint	0 – 10V... lamp voltage (10mV/V)
0 V				switch-off due to unignited lamp / lamp damaged; wiring; device defect	0V... lamp not ignited / gone out (check relais on flow chart, page 27) 0V...internal failure (check relais on flow chart, page 27) ATTENTION: 5 sec. safety ignition lock!!!
0,5 – 1,5V				power reduction (actual power < 100% power setpoint) / lamp, cooling	0.5V... lamp voltage too low 1.0V... lamp voltage too high 1.5V... insufficient device cooling
0,5 – 1,5V				switch-off due to power reduction (actual power < 80% power setpoint) / lamp; cooling	0.5V... lamp voltage too low 1.0V... lamp voltage too high 1.5V... insufficient device cooling
2 – 4V				switch-off due to earth leakage or short-circuit in the lamp circuit / wiring (cable; shielding; plug; lamp head; etc.)	2.5V... lamp Earth short circuit 3.5V... lamp short circuit
5 – 7V				switch-off due to mains failure / mains wiring (fuse; contactor; connectors; mains voltage; etc.)	5.5V... mains phase loss 6.5V... mains overvoltage

A

PPROVALS, STANDARDS AND SAFETY

Every device was carefully crafted and tested under the guidelines of the CE declaration of conformity. Details can be taken from the CE declaration of conformity.

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